L Number	Hits	Search Text	DB	Time stamp
1	17304	record$3 same (power or energy) with (manag$5 or control$4 or saving$1 or conserv$6 or reduc$4)	USPAT; US-PGPUB	2002/08/25 12:15
4	12520	(mode adj2 operat$3) same (power or energy or voltage$1) with (manag$5 or control$4 or saving$1 or conserv$6 or reduc$4)	USPAT; US-PGPUB	2002/08/25 12:16
7	2725	1.ti,ab,clm.	USPAT; US-PGPUB	2002/08/25 12:19
10	11265	713/$.ccls.	USPAT; US-PGPUB	2002/08/25 12:19
13	57	713/$.ccls. and 1.ti,ab,clm.	USPAT; US-PGPUB	2002/08/25 12:56
16	1995	4.ti,ab,clm.	USPAT; US-PGPUB	2002/08/25 12:57
19	140	4.ti,ab,clm. and 713/$.ccls.	USPAT; US-PGPUB	2002/08/25 12:57
22	41	((application$1 or task$1) with (determin$5 or identif$5 or type$1)) and (4.ti,ab,clm. and 713/$.ccls.)	USPAT; US-PGPUB	2002/08/25 12:59

09/285,879

PGPUB-DOCUMENT-NUMBER: 20010056509

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20010056509 A1

TITLE: Computer

PUBLICATION-DATE: December 27, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Iwata, Takeshi	Tachikawa-shi		JP	

US-CL-CURRENT: 710/20,**713/1** ,**713/300**

ABSTRACT:

A computer comprises a medium drive configured to reproduce data recorded in a video recording medium and an audio recording medium. When a reproduction switch is turned on if the computer is not powered, it is determined whether the video recording medium or the audio recording medium is loaded. If the video recording medium is loaded, the operating system is activated and the reproduction application is also activated.

---------- KWIC ---------

Current US Classification, US Secondary Class/Subclass - CCSR:

713/1

Current US Classification, US Secondary Class/Subclass - CCSR:

713/300

Claims Text - CLTX:

5. The computer according to claim 3, wherein said **controller** supplies **power** only to devices designed to reproduce the audio **recording** medium if it is determined that the **recording** medium is the audio **recording** medium.

Claims Text - CLTX:

6. The computer according to claim 3, wherein said **controller,** if it is determined that the **recording** medium is the video **recording** medium, supplies **power** to first devices designed to reproduce the video **recording** medium and second devices designed not to reproduce the video **recording** medium, and sets said second devices in a **power-saving** state.

Claims Text - CLTX:

7. A computer comprising: a medium drive configured to reproduce data **recorded in a recording** medium; a power switch of the medium drive; and a **controller** configured to determine a type of the **recording** medium in response to an operation of said **power** switch and perform a reproduction operation in

accordance with the determined type.

Claims Text - CLTX:

8. The computer according to claim 7, wherein said **controller** performs an audio reproduction operation without changing a **power** state of the computer if it is determined that the **recording** medium is an audio **recording** medium, and performs a video reproduction operation with activating an operating system of the computer and a video reproduction software if it is determined that the **recording** medium is a video **recording** medium.

Claims Text - CLTX:

10. The computer according to claim 7, wherein said **controller** supplies **power** only to devices designed to reproduce an audio **recording** medium if it is determined that the **recording** medium is the audio **recording** medium.

Claims Text - CLTX:

11. The computer according to claim 7, wherein said **controller** supplies **power** first devices designed to reproduce a video **recording** medium and sets said second devices in a **power-saving** state if it is determined that the **recording** medium is the video **recording** medium.

Claims Text - CLTX:

18. The computer according to claim 16, further comprising a medium drive configured to reproduce an audio **recording** medium and a video **recording** medium, and wherein said activation switch includes a medium drive **power** switch and a reproduction switch, and said **controller** is configured to determine a type of the **recording** medium, if it is determined that the **recording** medium is the audio **recording** medium, issue a reproduction command to said medium drive in response to an operation of the reproduction switch, if it is determined that the **recording** medium is the video **recording** medium, activate an operation system of the computer, and activate a video reproduction software in response to the operation of said reproduction switch.

US 20010056509A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2001/0056509 A1

Iwata (43) Pub. Date: Dec. 27, 2001

(54) COMPUTER

(75) Inventor: Takeshi Iwata, Tachikawa-shi (JP)

Correspondence Address:
Finnegan, Henderson, Farabow,
Garrett & Dunner, L.L.P.
1300 I Street, N.W.
Washington, DC 20005-3315 (US)

(73) Assignee: Kabushiki Kaisha Toshiba

(21) Appl. No.: 09/803,025

(22) Filed: Mar. 12, 2001

(30) Foreign Application Priority Data

Jun. 16, 2000 (JP) 2000-181917

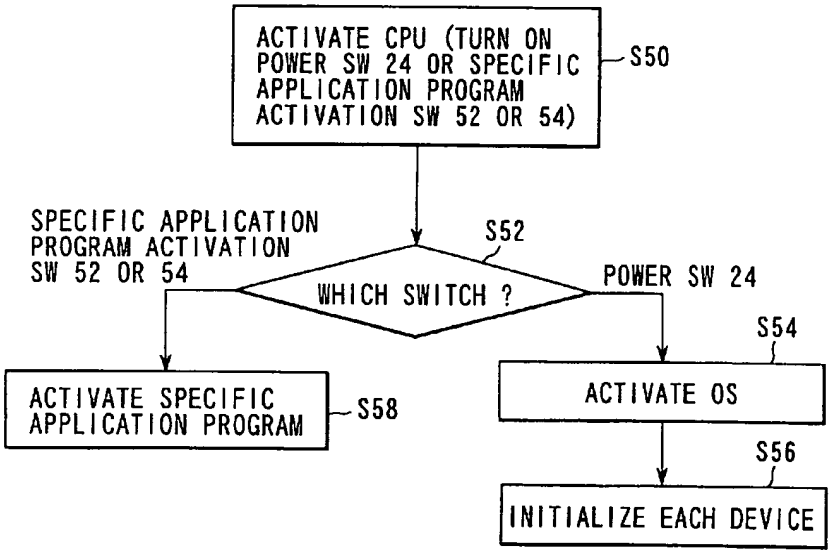
Publication Classification

(51) Int. Cl.[7] ... G06F 3/00; G06F 1/26; G06F 15/177; G06F 9/00; G06F 1/30

(52) U.S. Cl. 710/20; 713/300; 713/1

(57) ABSTRACT

A computer comprises a medium drive configured to reproduce data recorded in a video recording medium and an audio recording medium. When a reproduction switch is turned on if the computer is not powered, it is determined whether the video recording medium or the audio recording medium is loaded. If the video recording medium is loaded, the operating system is activated and the reproduction application is also activated.



US-PAT-NO: 5913067
DOCUMENT-IDENTIFIER: US 5913067 A

TITLE: Apparatus for adaptive power management of a computer system

DATE-ISSUED: June 15, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Klein; Dean A.	Eagle	ID	N/A	N/A

US-CL-CURRENT: **713/300**

ABSTRACT:

A method and apparatus for improved computer system **power management** is described. A **power management controller** includes a plurality of device idle timers, each associated with a particular I/O device. Expiration of the device idle timers, and the placing of the associated I/O device into a powered-down state, is controlled by device idle time values programmed into timing registers. The device idle time values are regularly updated as a function of time of day, time of week, etc., to optimize power efficiency. The device idle time values are determined by monitoring and **recording** the history of I/O device use. Thus, an I/O device may be quickly powered-down during those time periods during which device activity is not expected, whereas the I/O device will be maintained in a powered-up state during those times when device activity is probable. Also included are device activation timers which activate a powered-down computer system or particular I/O device in anticipation of a subsequent system event.

32 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

---------- KWIC ---------

Abstract Text - ABTX:

A method and apparatus for improved computer system **power management** is described. A **power management controller** includes a plurality of device idle timers, each associated with a particular I/O device. Expiration of the device idle timers, and the placing of the associated I/O device into a powered-down state, is controlled by device idle time values programmed into timing registers. The device idle time values are regularly updated as a function of time of day, time of week, etc., to optimize power efficiency. The device idle time values are determined by monitoring and **recording** the history of I/O device use. Thus, an I/O device may be quickly powered-down during those time periods during which device activity is not expected, whereas the I/O device will be maintained in a powered-up state during those times when device activity is probable. Also included are device activation timers which activate a powered-down computer system or particular I/O device in anticipation of a subsequent system event.

Current US Original Classification - CCOR:

713/300

US-PAT-NO: 5450073
DOCUMENT-IDENTIFIER: US 5450073 A

TITLE: Controlling power sequencing of a control unit in an input/output system

DATE-ISSUED: September 12, 1995

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Brown; Paul J.	Poughkeepsie	NY	N/A	N/A
Elliott; Joseph C.	Hopwell Junction	NY	N/A	N/A
Laubli; Bernhard	Endicott	NY	N/A	N/A
Lynch; Kenneth R.	Rhinebeck	NY	N/A	N/A
Micka; William F.	Tucson	AZ	N/A	N/A

US-CL-CURRENT: 340/3.1; 307/114 ; 307/40 ; 340/313 ; **713/300**

ABSTRACT:

A mechanism for controlling the powering-on and powering-off of control units in a data processing system having a plurality of channels, a plurality of control units, and a communications network of links for linking the channels to the control units. Each **control** unit includes a **power-control** table for **recording power-control** allegiance of the **control** unit to the channels. Where a **control** unit receives a **power**-on command from a channel, it **records** the identity of the channel in its **power-control** table. When a channel orders a **control** unit to **power**-off, the **control** unit checks to see if it owes **power-control** allegiance to the ordering channel. If it does, the **control** unit deletes the identity from its **power-control** table. The **control** unit will not **power**-off unless its **power-control** table is empty, indicating that it does not owe allegiance to any other channel.

11 Claims, 13 Drawing figures

Exemplary Claim Number: 2

Number of Drawing Sheets: 9

---------- KWIC ---------

Abstract Text - ABTX:

A mechanism for controlling the powering-on and powering-off of control units in a data processing system having a plurality of channels, a plurality of control units, and a communications network of links for linking the channels to the control units. Each **control** unit includes a **power-control** table for **recording power-control** allegiance of the **control** unit to the channels. Where a **control** unit receives a **power**-on command from a channel, it **records** the identity of the channel in its **power-control** table. When a channel orders a **control** unit to **power**-off, the **control** unit checks to see if it owes **power-control** allegiance to the ordering channel. If it does, the **control** unit deletes the identity from its **power-control** table. The **control** unit will not **power**-off unless its **power-control** table is empty, indicating that it does not owe allegiance to any other channel.

Claims Text - CLTX:

said each of said plurality of input/output **control** units **recording in its control** unit association table, in response to a **power**-on command, an entry identifying the source of said **power**-on command;

Claims Text - CLTX:

said each of said plurality of input/output **control** units **recording in its control** unit association table, in response to a **power**-on command, an entry identifying the source of said **power**-on command;

Current US Cross Reference Classification - CCXR:

713/300

US-PAT-NO: 6079025
DOCUMENT-IDENTIFIER: US 6079025 A

TITLE: System and method of computer operating mode control for power consumption reduction

DATE-ISSUED: June 20, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fung; Henry Tat-Sang	San Jose	CA	N/A	N/A

US-CL-CURRENT: 713/323; 713/320

ABSTRACT:

An activity sensing power reduction and conservation apparatus, system, and method for a computer system. The computer system has resources including a processor, a memory, and an input/output device, and an operating system for controlling the resources. At least one of the resources can be placed into in any one of three operating modes including a first mode having a first power consumption level, a second mode having a second power consumption level less than the first level, and a third mode having a third level less than the second level. The first mode may be characterized by maintaining clocking of the processor at a first clock frequency, the second mode by clocking the processor at a second clock frequency less than the first frequency or by not maintaining clocking of the processor, and the third mode by maintaining operation of the memory to preserve the integrity of any stored memory contents. During operation of the computer system in the first mode, activity is monitored to detect completion of idle threads executing on the system, and the processor clock is slowed or stopped to at least that one resource in response to the idle thread completion detection. During operation in the second mode where the processor clock is slowed or stopped, a slow or stop resource command is generated to slow or turn off clock signal to at least one of the resources in response to occurrence of a timeout condition indication received from a timer circuit.

48 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

---------- KWIC ---------

Abstract Text - ABTX:

An activity sensing power reduction and conservation apparatus, system, and method for a computer system. The computer system has resources including a processor, a memory, and an input/output device, and an operating system for controlling the resources. At least one of the resources can be placed into in any one of three operating modes including a first mode having a first power consumption level, a second mode having a second power consumption level less than the first level, and a third mode having a third level less than the second level. The first mode may be characterized by maintaining clocking of the processor at a first clock frequency, the second mode by clocking the processor at a second clock frequency less than the first frequency or by not

maintaining clocking of the processor, and the third mode by maintaining operation of the memory to preserve the integrity of any stored memory contents. During operation of the computer system in the first mode, activity is monitored to detect completion of idle threads executing on the system, and the processor clock is slowed or stopped to at least that one resource in response to the idle thread completion detection. During operation in the second mode where the processor clock is slowed or stopped, a slow or stop resource command is generated to slow or turn off clock signal to at least one of the resources in response to occurrence of a timeout condition indication received from a timer circuit.

Brief Summary Text - BSTX:

Computers function to execute application programs such as word processing, spreadsheet and data base management programs. Typically, the computer and the application programs are under the control of a software operating system that manages the different system parts and resources including some I/O devices. For example, during the execution of an application program when the CPU wishes to check to determine if any key has been depressed on the keyboard, the CPU through a subroutine call to the operating system requests the operating system through execution of a subroutine to perform a key-actuation detection task. Since the operating system performs many such tasks, the operating system has a detailed knowledge of many activities within the computer. However, under some circumstances, application programs bypass the operating system and directly address I/O devices. Typically, each I/O device is assigned an I/O address within an I/O address range. For application programs which directly address I/O devices without operating system calls, the operating system is not immediately aware of I/O activity. With such complex operation in computers, the task of power conservation is difficult.

Brief Summary Text - BSTX:

In the software monitor, inactivity is determined by detecting how many "active" or "idle" function calls an application makes within some time period. In the IBM PC DOS environment, the activity status is checked, for example, no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and, in principle, each is labeled as "idle" or "active" and each is assigned a corresponding positive or negative number. A positive number is assigned to an "active" function call and a negative number to an "idle" function call.

Detailed Description Text - DETX:

The computer 3 typically includes as software an operating system adapted to control the computer system and to control operations during application program execution. Computer 3 functions to execute application programs such as word processing, spreadsheet and data base management programs. Computer 3, during the execution of application programs, is under control of a software operating system. The operating system manages the different system parts and resources including the I/O devices 6 and 7. For example, during the execution of an application program when the CPU wishes to check to determine if any key has been depressed on a keyboard I/O device, the CPU 4 through a subroutine call to the operating system requests the operating system to execute a subroutine to perform a key-actuation detection task. Since the operating system performs many similar calls to the operating system, these calls represent detailed information about many activities within the computer system.

Detailed Description Text - DETX:

In the software monitor 80, inactivity is determined by detecting how many active or idle function calls an application makes within some time period. In the IBM PC DOS environment, the activity status is checked no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and each is labeled as idle or active with a corresponding positive or negative number. A positive number is assigned to an active function call and a negative number to an idle function call. The power management software module keeps a running total of the accumulated value of the function call numbers as the function calls are made. Whenever a function call is made, (either active or idle), the power management software module algebraically adds the number to the accumulated value and decides whether the system is active or not by comparing the magnitude of the accumulated value with a function call threshold. The function call threshold for determining activity is a variable depending on the computer system speed.

Current US Original Classification - CCOR:

713/323

Current US Cross Reference Classification - CCXR:

713/320

US-PAT-NO: 6079025
DOCUMENT-IDENTIFIER: US 6079025 A

TITLE: System and method of computer operating mode control for power consumption reduction

DATE-ISSUED: June 20, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fung; Henry Tat-Sang	San Jose	CA	N/A	N/A

US-CL-CURRENT: **713/323**; **713/320**

ABSTRACT:

An activity sensing **power reduction and conservation** apparatus, system, and method for a computer system. The computer system has resources including a processor, a memory, and an input/output device, and an operating system for controlling the resources. At least one of the resources can be placed into in any one of three operating modes including a first mode having a first power consumption level, a second mode having a second power consumption level less than the first level, and a third mode having a third level less than the second level. The first mode may be characterized by maintaining clocking of the processor at a first clock frequency, the second mode by clocking the processor at a second clock frequency less than the first frequency or by not maintaining clocking of the processor, and the third **mode by maintaining operation** of the memory to preserve the integrity of any stored memory contents. During operation of the computer system in the first mode, activity is monitored to detect completion of idle threads executing on the system, and the processor clock is slowed or stopped to at least that one resource in response to the idle thread completion detection. During operation in the second mode where the processor clock is slowed or stopped, a slow or stop resource command is generated to slow or turn off clock signal to at least one of the resources in response to occurrence of a timeout condition indication received from a timer circuit.

48 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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Abstract Text - ABTX:

An activity sensing **power reduction and conservation** apparatus, system, and method for a computer system. The computer system has resources including a processor, a memory, and an input/output device, and an operating system for controlling the resources. At least one of the resources can be placed into in any one of three operating modes including a first mode having a first power consumption level, a second mode having a second power consumption level less than the first level, and a third mode having a third level less than the second level. The first mode may be characterized by maintaining clocking of the processor at a first clock frequency, the second mode by clocking the processor at a second clock frequency less than the first frequency or by not

maintaining clocking of the processor, and the third **mode by maintaining operation** of the memory to preserve the integrity of any stored memory contents. During operation of the computer system in the first mode, activity is monitored to detect completion of idle threads executing on the system, and the processor clock is slowed or stopped to at least that one resource in response to the idle thread completion detection. During operation in the second mode where the processor clock is slowed or stopped, a slow or stop resource command is generated to slow or turn off clock signal to at least one of the resources in response to occurrence of a timeout condition indication received from a timer circuit.

Brief Summary Text - BSTX:

Computers function to execute application programs such as word processing, spreadsheet and data base management programs. Typically, the computer and the application programs are under the control of a software operating system that manages the different system parts and resources including some I/O devices. For example, during the execution of an **application** program when the CPU wishes to check to **determine** if any key has been depressed on the keyboard, the CPU through a subroutine call to the operating system requests the operating system through execution of a subroutine to perform a key-actuation detection **task**. Since the operating system performs many such tasks, the operating system has a detailed knowledge of many activities within the computer. However, under some circumstances, application programs bypass the operating system and directly address I/O devices. Typically, each I/O device is assigned an I/O address within an I/O address range. For application programs which directly address I/O devices without operating system calls, the operating system is not immediately aware of I/O activity. With such complex operation in computers, the task of power conservation is difficult.

Brief Summary Text - BSTX:

In the software monitor, inactivity is **determined** by detecting how many "active" or "idle" function calls an **application** makes within some time period. In the IBM PC DOS environment, the activity status is checked, for example, no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and, in principle, each is labeled as "idle" or "active" and each is assigned a corresponding positive or negative number. A positive number is assigned to an "active" function call and a negative number to an "idle" function call.

Detailed Description Text - DETX:

The computer 3 typically includes as software an operating system adapted to control the computer system and to control operations during application program execution. Computer 3 functions to execute application programs such as word processing, spreadsheet and data base management programs. Computer 3, during the execution of application programs, is under control of a software operating system. The operating system manages the different system parts and resources including the I/O devices 6 and 7. For example, during the execution of an **application** program when the CPU wishes to check to **determine** if any key has been depressed on a keyboard I/O device, the CPU 4 through a subroutine call to the operating system requests the operating system to execute a subroutine to perform a key-actuation detection **task**. Since the operating system performs many similar calls to the operating system, these calls represent detailed information about many activities within the computer system.

Detailed Description Text - DETX:

In the software monitor 80, inactivity is **determined** by detecting how many active or idle function calls an **application** makes within some time period. In the IBM PC DOS environment, the activity status is checked no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and each is labeled as idle or active with a corresponding positive or negative number. A positive number is assigned to an active function call and a negative number to an idle function call. The power management software module keeps a running total of the accumulated value of the function call numbers as the function calls are made. Whenever a function call is made, (either active or idle), the power management software module algebraically adds the number to the accumulated value and decides whether the system is active or not by comparing the magnitude of the accumulated value with a function call threshold. The function call threshold for determining activity is a variable depending on the computer system speed.

Current US Original Classification - CCOR:

713/323

Current US Cross Reference Classification - CCXR:

713/320

US-PAT-NO: 5719800
DOCUMENT-IDENTIFIER: US 5719800 A

TITLE: Performance throttling to reduce IC power consumption

DATE-ISSUED: February 17, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mittal; Millind	South San	CA	N/A	N/A
Valentine; Robert	Francisco	N/A	N/A	IL
	Qiryat Tivon			

US-CL-CURRENT: 713/321; 713/322 ; 713/323

ABSTRACT:

The power consumed within an integrated circuit (IC) is reduced without substantial impact on its performance for typical applications by throttling the performance of particular functional units within the IC. Artificial worst-case power consumption is reduced by throttling down the activity levels of long-duration sequences of high-power operations. The recent utilization levels of particular functional units within an IC are monitored--for example, by computing each functional unit's average duty cycle over its recent operating history. If this activity level is greater than a threshold, then the functional unit is operated in a reduced-power mode. The threshold value is set large enough to allow short bursts of high utilization to occur without impacting performance. The invention allows an integrated circuit to dynamically make the tradeoff between high-speed operation and low-power operation, by throttling back performance of localized functional units when their utilization exceeds a sustainable level. Additionally, this dynamic power/speed tradeoff can be optimized across multiple functional units within an IC or among multiple ICs within a system. Additionally, this dynamic power/speed tradeoff can be altered by providing software control over throttling parameters.

32 Claims, 6 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

---------- KWIC ---------

Detailed Description Text - DETX:

Additionally in this example, power coordinator 503 could raise or lower the maximum sustainable duty cycle for each of instruction cache functional unit #1 and data cache functional unit #2 based on whether or not the current activity level associated with floating-point functional unit #3 exceeds a threshold, The premise here is that floating-point functional unit #3 is never throttled because the performance penalty paid by doing that is larger than that paid by backing off on the maximum duty cycles of the caches. In practice this premise is true for some architectures performing some **types of applications,** and for other architectures or **types of applications** it would be the other way around. The monitoring and control schemes of the present invention are flexible enough to accommodate a wide range of such variations.

Claims Text - CLTX:

controlling the mode of operation of a second functional unit within said IC, said second functional unit having a second activity level related to said first activity level of said first functional unit, and being operable in a normal mode and in a reduced-p**ower mode by** placing said second functional unit in said reduced-p**ower mode whe**n said first activity level is greater than a threshold.

Claims Text - CLTX:

controlling the mode of operation of a plurality of functional units within said IC based on a set of throttling parameters, each said functional units being operable in a normal mode and in a reduced-p**ower mode; a**nd

Current US Original Classification - CCOR:

713/321

Current US Cross Reference Classification - CCXR:

713/322

Current US Cross Reference Classification - CCXR:

713/323

US005710929A

United States Patent [19]

Fung

[11] Patent Number: 5,710,929

[45] Date of Patent: Jan. 20, 1998

[54] **MULTI-STATE POWER MANAGEMENT FOR COMPUTER SYSTEMS**

[75] Inventor: **Henry Tat-Sang Fung**, San Jose, Calif.

[73] Assignee: **Vadem Corporation**, San Jose, Calif.

[21] Appl. No.: **458,189**

[22] Filed: **Jun. 2, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 285,169, Aug. 3, 1994, abandoned, which is a continuation of Ser. No. 17,975, Feb. 12, 1993, Pat. No. 5,396,635, which is a continuation of Ser. No. 908,533, Jun. 29, 1992, abandoned, which is a continuation of Ser. No. 532,314, Jun. 1, 1990, abandoned.

[51] **Int. Cl.**[6] **G06F 1/32**

[52] **U.S. Cl.** **395/750**; 364/273.1; 364/273.3; 364/DIG. 1

[58] **Field of Search** ..... 395/800, 750; 364/273.1, 273.3, DIG. 1

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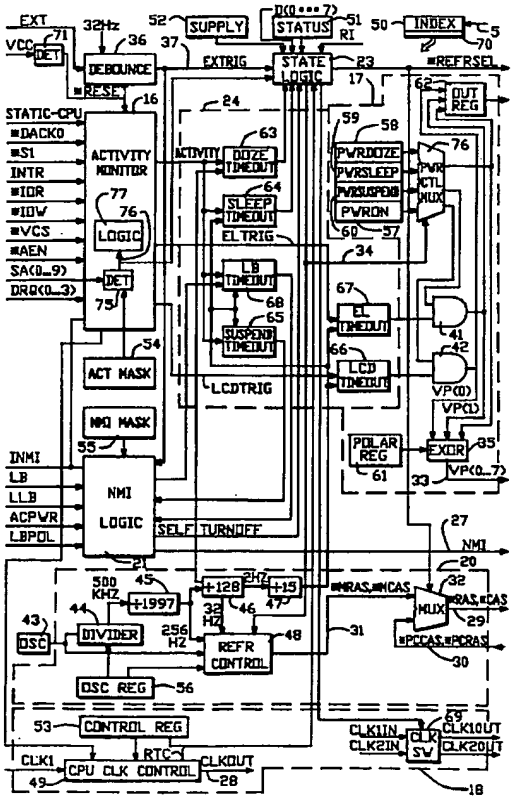
Primary Examiner—John E. Harrity

Attorney, Agent, or Firm—Flehr Hohbach Test Albritton & Herbert LLP; R. Michael Ananian

[57] **ABSTRACT**

A power conservation system for use in a computer system. The power conservation system has an activity mointor and a plurality of modes of operation. By controlling the power mode of operation in response to the activity of the computer system, the power consumption of the computer system is controlled. Coupling of circuit power and clock signals are used to control power consumption and both hardware and software components may separately or together monitor and control operation.

12 Claims, 5 Drawing Sheets



US-PAT-NO: 5758175
DOCUMENT-IDENTIFIER: US 5758175 A

TITLE: Multi-mode power switching for computer systems

DATE-ISSUED: May 26, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fung; Henry Tat-Sang	San Jose	CA	N/A	N/A

US-CL-CURRENT: 713/323; 713/300 ; 713/320

ABSTRACT:

A power conservation system for use in a computer system. The power conservation system has an activity monitor and a plurality of modes of operation. The power conservation system has a power switching unit which couples the power supply to a selected group of the computer system circuits depending upon the power mode of operation. By controlling the power mode in response to the activity of the computer system, the power consumption of the computer system can be controlled.

28 Claims, 10 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

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Abstract Text - ABTX:

A power conservation system for use in a computer system. The power conservation system has an activity monitor and a plurality of modes of operation. The power conservation system has a power switching unit which couples the power supply to a selected group of the computer system circuits depending upon the power mode of operation. By controlling the power mode in response to the activity of the computer system, the power consumption of the computer system can be controlled.

Brief Summary Text - BSTX:

Computers function to execute application programs such as word processing, spreadsheet and data base management programs. Typically, the computer and the application programs are under the control of a software operating system that manages the different system parts and resources including some I/O devices. For example, during the execution of an application program when the CPU wishes to check to determine if any key has been depressed on the keyboard, the CPU through a subroutine call to the operating system requests the operating system through execution of a subroutine to perform a key-actuation detection task. Since the operating system performs many such tasks, the operating system has a detailed knowledge of many activities within the computer. However, under some circumstances, application programs bypass the operating system and directly address I/O devices. Typically, each I/O device is assigned an I/O address

within an I/O address range. For application programs which directly address I/O devices without operating system calls, the operating system is not immediately aware of I/O activity. With such complex operation in computers, the task of power conservation is difficult.

Brief Summary Text - BSTX:

In the software monitor, inactivity is **determined** by detecting how many "active" or "idle" function calls an **application** makes within some time period. In the IBM PC DOS environment, the activity status is checked, for example, no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and, in principle, each is labeled as "idle" or "active" and each is assigned a corresponding positive or negative number. A positive number is assigned to an "active" function call and a negative number to an "idle" function call.

Detailed Description Text - DETX:

The computer 3 typically includes as software an operating system adapted to control the computer system and to control operations during application program execution. Computer 3 functions to execute application programs such as word processing, spreadsheet and data base management programs. Computer 3, during the execution of application programs, is under control of a software operating system. The operating system manages the different system parts and resources including the I/O devices 6 and 7. For example, during the execution of an **application** program when the CPU wishes to check to **determine** if any key has been depressed on a keyboard I/O device, the CPU 4 through a subroutine call to the operating system requests the operating system to execute a subroutine to perform a key-actuation detection **task**. Since the operating system performs many similar calls to the operating system, these calls represent detailed information about many activities within the computer system.

Detailed Description Text - DETX:

In the software monitor 80, inactivity is **determined** by detecting how many active or idle function calls an **application** makes within some time period. In the IBM PC DOS environment, the activity status is checked no less frequently than every 50 milliseconds. There are 256 IBM PC DOS function calls and each is labeled as idle or active with a corresponding positive or negative number. A positive number is assigned to an active function call and a negative number to an idle function call. The power management software module keeps a running total of the accumulated value of the function call numbers as the function calls are made. Whenever a function call is made, (either active or idle), the power management software module algebraically adds the number to the accumulated value and decides whether the system is active or not by comparing the magnitude of the accumulated value with a function call threshold. The function call threshold for determining activity is a variable depending on the computer system speed.

Claims Text - CLTX:

power director means which in response to the mode of o**peration establish**ed by said mode controlle**r selectiv**ely couples each of the plurality of power co**ntrol lines to** said memory cell such that a signal is generated on the power co**ntrol line tha**t is dependent upon the state of the memory cell;

Claims Text - CLTX:

power director means which in response to the mode of operation of the mode controller selectively couples each of the plurality of power control lines to said memory cell associated with that power control line such that a signal is generated on the power control line that is dependent upon the state of the memory cell to which it is coupled;

Claims Text - CLTX:

controlling a power mode of operation in response to said conserve signal to select a mode of operation from among at least a first mode and a second mode; and

Current US Original Classification - CCOR:

713/323

Current US Cross Reference Classification - CCXR:

713/300

Current US Cross Reference Classification - CCXR:

713/320